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Off With The Old; On With The New STACKS

With the close of the 1951-1952 shipping season just behind us and with the opening of the 1952-1953 shipping season just around the corner ahead of us, citrus growers of Florida are looking forward with hopeful anticipation of a more profitable season than the one just closed.

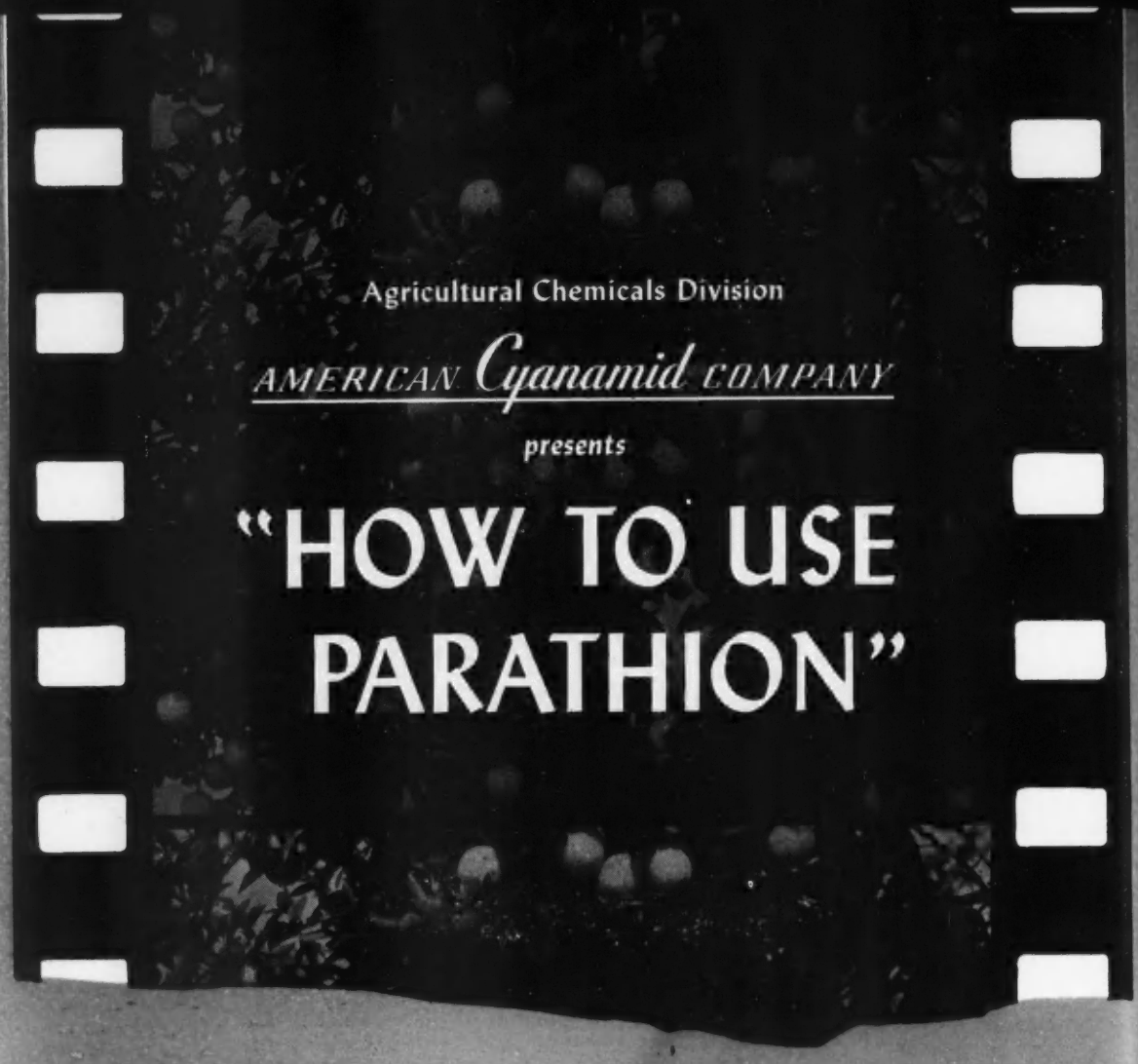
Reports from field men indicate that the new crop is sizing up well in most sections of the citrus belt. Reports also indicate that growers have been exercising the utmost vigilance to assure the production of quality fruit, which is the first step in the program for a profitable season.

Grower agencies, the Florida Citrus Commission, Florida Citrus Mutual and other grower agencies have been hard at work on programs of activity which it is hoped may operate to the benefit of the producers.

While there is no disposition to be overly optimistic, there is a well defined spirit of hopefulness that the season soon to open will be one of profit for growers.

This Month

Vol. 33, No. 8 Bartow, Florida August, 1952



Agricultural Chemicals Division

AMERICAN Cyanamid COMPANY

presents

"HOW TO USE PARATHION"

This movie, produced in cooperation with the Florida Citrus Experiment Station, provides a step-by-step description of the proper use and handling of parathion insecticides.

Prints of this full-color, sound film are available in 16 mm. size for showing to grove owners, managers and all persons interested in the use of parathion.

To see this interesting, informative film, just get in touch with your County Agent or the Citrus Experiment Station at Lake Alfred, Florida . . . or drop us a line.

AMERICAN Cyanamid COMPANY

Manufacturer of Thiophos® Parathion Technical

Agricultural Chemicals Division

Brewster, Florida

WRITE FOR NEW 1952 PARATHION GROWER'S HANDBOOK

Citrus Insect Control For August, 1952 . . .

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Purple and red scale activity has been declining since mid-July. There has been a reduction in average infestation since that time, and the percentage of scales in young stages has been decreasing. While an additional hatch can be expected to begin during August, it is expected that during the earlier part of the month the percentage of scales in the older and egg stages will be too high for satisfactory control.

In spite of the early spring increase in scale populations which occurred this year, the peak infestations which occurred early in July were substantially lower than those of last year. This does not remove the possibility that a heavy fall infestation might occur.

The peak of purple mite infestations was reached early in July and the average population is now falling rapidly. While the highest population level was reached six weeks later this year than last, it did not reach such a high level, and the decline has been so rapid that the level at the time this is written is about the same as a year ago. Some groves are still heavily infested, but we have seen numerous cases where high populations have nearly disappeared without control measures being applied.

Rust mites have been increasing during the past six weeks, especially on the fruit. Activity may be expected to continue at a high level through August, and serious losses due to russetting of the fruit and injury to the leaves by greasy spot may be expected if rust mites are not kept under control.

Mealybug infestations have been declining rapidly and few, if any groves, still have important infestations. The peak of six-spotted infestations this year was a month later than usual, but damage did not approach that which occurred last year.

Whitefly infestations are now on the decline. In many groves high populations, with resulting heavy deposits of sooty mold, were avoided by timely application of oil or parathion.

Black scale has been increasing in abundance and is now present in half the groves being surveyed. This scale has occurred in serious numbers in only a few instances in Florida and is subject to high natural mortality in this State.

SPRAY PROGRAMS

Rust mite will present the principal control problem during August, except in some groves that were not sprayed in June or July, in which scale control will be necessary. Wettable sulfur is the safest material to use for rust mite control. A combination of wettable sulfur and lime-sulfur may be used on late varieties of oranges and on grapefruit, but even on these there is more possibility of foliage or fruit injury than with wettable sulfur alone. Lime-sulfur should not be used during August on tangerines or on early or mid-season oranges, nor should it be used at a rate higher than one gallon per 100 on late oranges or on grapefruit. Lime-sulfur is more toxic to entomogenous fungi than is wettable or dusting sulfur, so its use may have some adverse effect on natural mortality of scales and purple mites.

Wettable sulfur should be used at a rate of 10 pounds per 100 gallons if used alone, or a rate of 5 to 8 pounds if used with parathion or lime-sulfur.

Some growers will prefer to use sulfur dusting for rust mite control. From ½ to 1½ pounds per tree should be used, depending on the size of the trees. Coverage should be thorough on both sides and care must be taken to obtain sufficient deposit of sulfur in the tops of the trees. Best results are obtained when the air is quiet and the foliage is wet with rain or dew. Usually, conditions for dusting are most favorable at night.

Spraying for scale control should be delayed until after the middle of August, unless a severe infestation makes emergency action necessary. During late August and September, a larger percentage of the scales can be expected to be in the young stages. These are more easily killed and a higher degree of control can be obtained.

During the late summer and fall, parathion is the preferred material for scale control. Oil may be used, but will retard the formation of soluble solids in the fruit. From 1 2/3 to 2 pounds of parathion per 100 gallons should be used unless the grove received a scalicide in the post-bloom period, and

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*Written July 25, 1952. Reports of surveys by Harold Holtsberg, Cocoa; J. W. Davis, Tavares; K. G. Townsend, Tampa; J. B. Weeks, Avon Park; and T. B. Hallam, Lake Alfred.

Station Issues Instructions On Use Of Parathion

Dr. A. F. Camp, Vice-Director in Charge of the Citrus Experiment Station at Lake Alfred, has issued the following memorandum to Supervisors of Personnel Using Parathion, based upon the findings of W. L. Thompson and C. R. Stearns, Jr., who have carried on extensive experiments and given close study to the use of parathion by citrus growers:

To Supervisors of Personnel Using Parathion

During the past year, a certain amount of carelessness has developed in the handling of parathion in Florida and there is grave danger that there will be illnesses or even deaths, unless proper precautions are taken by all concerned. Doctors, also, are not sending in blood samples in all cases of suspected parathion illness and may in some cases be making misleading diagnoses as a result. A number of illness from supposed parathion exposure have been reported, some of which we believe may not have been diagnosed correctly, and if such reports of either real or suspected parathion poisoning continue **to go in there is a strong likelihood** that the industrial insurance rate will rise sharply for personnel involved in the use of this chemical. There is also the possibility that a bill might be introduced outlawing the use of this materials which has shown great value and benefit to the Florida citrus industry.

The research men at the Citrus Experiment Station have summarized the findings on the medical research on parathion for the 1951 season and have prepared some precautions and instructions which should be thoroughly read and digested by those responsible for the spraying of parathion. Failure to heed some of these precautions is inevitably going to result in a rise in the number of parathion poisoning cases. It should be emphasized that in all cases of suspected parathion poisoning the **supervisor should make certain that the examining doctor sends a blood specimen to one of the listed laboratories for analysis.** Frequently, unless the person bringing in the patient requests this, it is not done and diagnoses are made without the aid of this, the only positive test, so in all cases the supervisor **should not only request but insist** that the doctor send in such a blood specimen and give to the supervisor a copy of the report from the laboratory.

Conclusions Drawn from Cholinesterase Studies of Citrus Grove Labor Following Exposure to Parathion

During the 1951 season cholinesterase studies of citrus grove labor following exposure to parathion showed that in addition to the precautions already published, the following should be taken into consideration:

1. Cholinesterase showed a steady decrease both as a function of days exposed and pounds of parathion handled.
2. Cholinesterase decrease was the most rapid among concentrated spray operators.
3. For five men who did not wear masks, greater decreases in cholinsterase were recorded than for other men in similar jobs, but wearing masks.
4. Men engaged in concentrate spray operations should be limited to not more than 7-10 days continuous exposure for Speed Sprayer drivers and 3-4 days for supply tank operators if they are supplying more than one Speed Sprayer.
5. Hand gun operators should not spray for more than 5-7 days continuously.
6. Speed Sprayer drivers exposure should be limited to 10-14 days.
7. No man should handle more than about 2,000 pounds of parathion without a period of freedom from exposure.
8. Blood tests of plasma and red blood cell cholinesterase should be made prior to exposure to parathion.
9. Periodic blood checks on cholinesterase will permit exposure periods to be prolonged.
10. If plasma or red blood cell cholinesterase fall below 70% of normal, the man should not be allowed to spray with parathion.
11. A man may return to spraying parathion when his blood cholinesterase has returned to the pre-exposure level.

(Continued on page 13)

CITRUS INSECT CONTROL FOR AUGUST 1952

(Continued from page 3)

as a result has a low scale population at this time. In that case, one pound of parathion per 100 gallons may be used.

Timely Suggestion: Continued observance of all precautions recommended for the use of parathion is necessary to prevent illness.

Whether spraying or dusting for rust mite control, use sufficient material for the size of the trees being covered, and make the application thorough. It is extremely poor economy to skimp on materials or to do an inadequate job of covering the trees. This will result in the necessity of making more frequent application, so the expense will be higher in the long run and will increase the danger of rust mite injury occurring between applications.

For more detailed information refer to the 1952 "Better Fruit Program" or consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

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Control Of Decay Of Florida Oranges During Storage

PAUL L. HARDING, JAMES S. WIANT, H. W. HRUSCHKA, M. BRYAN SUNDAY AND J. KAUFMAN

The Effect of Prestorage Packinghouse Treatments on the Control of Decay of Florida Oranges During Storage at Orlando, Florida, and New York City, 1951.

Last year we printed the report of tests made at Orlando and New York on the control of decay in Florida oranges for the year 1950. This is a similar report of tests made at the same stations for the year 1951, by the Bureau of Plant Industry, Soils and Agricultural Engineering.—Editor.

This is a report of the 1951 storage experiments with Valencia oranges conducted at Orlando, Fla., and New York, N. Y. The tests were a part of the investigation on the storage of citrus fruits conducted by the Bureau of Plant Industry, Soils and Agricultural Engineering, and The Refrigeration Research Foundation.

SUMMARY

Valencia oranges that had been treated with Dowicide A-hexamine solution in the dip tank developed much less decay in storage than did similar untreated fruit. A borax dip treatment made 24 hours prior to the Dowicide A-hexamine treatment gave added control of decay, and the use of phenodor (diphenyl-treated) box liners reduced it still further. It would appear that the Dowicide A-hexamine treatment supplemented by either the phenodor box liner or the phenodor-treated corrugated fiberboard carton offers an excellent method of controlling decay in stored fruit. In the present tests fruit so treated developed less than 5 percent decay when held for seven days at 70°F. following sixteen weeks' storage at 32° F. A borax dip 24 hours prior to the Dowicide A-hexamine treatment as mentioned above gave additional control of storage decay, and when used in combination with phenodor liners held decay to less than 2 percent in fruit stored sixteen weeks at 32°F. and seven days at 70°.

Loss in weight among the lots with different packinghouse treatments ranged between 3.3 to 3.6 percent. The naked packs of oranges lost 4.2 percent as compared with 2.7 percent for fruit packed in boxes with phenodor liners.

Good control of decay was obtained when the fruit for storage was packed in phenodor-treated fiberboard cartons or in Bruce boxes with phenodor-treated box liners. Nevertheless, the smallest amounts of total decay occurred when the fruit was packed in the phenodor-treated fiberboard cartons.

Considerable variation in storage quality was found in fruit from different groves.

Size of fruit influenced keeping quality; a greater amount of decay was noted in the large sizes (126 and 150 per box) than in smaller

1. Acknowledgement is due W. T. Pentzer, U. S. Department of Agriculture, Beltsville, Md., and H. C. Diehl, Director of The Refrigeration Research Foundation, Colorado Springs, Colo., and to the following staff members of the Division of Handling, Transportation, and Storage of Horticultural Corps: Arthur Dickinson, B. A. Friedman, Neil Gardner, W. A. Radspinner, and G. Lee Roberts. Acknowledgement is also due the following growers, shippers, and cold storage warehouse officials for their generous cooperation: American Fruit Growers, Inc., George W. Boutilier, John J. Brossard, Chase and Co., Randall Chase, Frank Chase, Sydney Chase, Paul B. Christensen, Citrus Container Institute, Albert P. Connelly, J. V. D'Alboro Co., Egan-Ficket Co., Haines City Citrus Growers Assn., Arnold Hampson, Corbett Hutchinson, A. J. Kackenmester, W. Kinney, J. I. Lyle III, Merchants Cold Storage and Warehouse Co., Providence, R. I., Merchants Refrigerating Co., New York City, A. B. Michael, Nevins Fruit Co., Orlando Citrus Growers Assn., Arthur N. Otis, J. J. Parrish, Dr. P. Phillips Co., R. V. Phillips, A. E. Pickard, Raymond D. Robinson, Roper Growers Coop., Frank Roper, Mrs. Charlotte Roper, Frank Sharp, Waverly Growers Coop., Brantley A. Weathers, Jr., Weathers' Packaging Co., and J. G. Welsh.

sizes (176 to 250 per box).

Tests showed that rootstocks affected storage quality of the oranges and that smaller amounts of decay occurred in the fruit on sour and sweet orange than in the fruit on rough lemon rootstock.

Six commercial carloads were stored in good condition for four to seven weeks at 32° at Providence, R. I., and Newark, N. J., but owing to unfavorable market conditions no profit was made by the venture. Favorable results were obtained in phenodor-treated fiberboard cartons but their slower cooling in transit offset some of their advantages in retarding decay. The added treatment of Dowicide A-hexamine may be advisable.

On the basis of results presented elsewhere in this report it would appear very worthwhile to treat all oranges going into storage with Dowicide A-hexamine and to use diphenyl-treated liners as an added precaution.

It is also suggested that shippers grade fruit more carefully and avoid storing poor quality, weak fruit.

MATERIALS AND METHODS

The fruit for the tests, unless specified, was limited to sizes 150, 176, 200, 216, and 250, and was packed mostly in Bruce boxes with phenodor-treated liners. The oranges for these tests were obtained from nine different shippers and were representative of the commercial pack and quality being marketed at that season of the year.

At Orlando and New York, the cold storage rooms were operated at 32°F. The rooms were checked frequently and continuous records were obtained by hygro-thermographs. Except for minor fluctuations the temperatures were maintained within a narrow range.

Methods of procedure and of inspection of fruit were much like those used in 1949 and 1950. In scoring the several types of skin breakdown, a given fruit showing both aging and pitting was scored under the defect that was considered the more serious blemish. Decay was always considered more serious than any type of skin breakdown. Decayed fruits were classified under stem-end rot when the symptoms were characteristic of **Diplodia** rot or **Phomopsis** rot, even though the decay occurred elsewhere than at the stem end. Three inspections were made on each box of fruit; namely, at the time the boxes were removed from storage, three days after removal, and seven days after removal. During this seven-day holding period the temperature was 70°F. and the relative humidity 70 to 90 percent.

The phenodor (diphenyl-treated) liners, where used, were removed at the first inspection. Decayed oranges were removed and discarded at the first and second inspections and the sound fruit was repacked into the test boxes. The amount of decay recorded for the second and third inspections is cumulative, that is, it includes decay counts for all previous inspections. Pitting and aging records of the second and third inspections are not cumulatives, but instead, are based on actual counts made at the particular inspection. It should be noted that decays other than stem-end rot and **Penicillium** rot are not listed by specific types, but are included with total of decay in each instance. Thus the total of decay may be somewhat greater than the sum of decay attributed to stem-end rot and **Penicillium** rots.

Tests were made at Orlando and New York comparing prestorage chemical treatments and phenodor liners on the control of decay of oranges stored at 32°F. A description of the treatments follow:

1. **Unwashed.** Fruit sorted for size and soundness, but other wise packed in the same condition as when received at the packinghouse.
2. **Washed.** Fruit washed, waxed and polished, sorted for size and soundness, but not otherwise treated.
3. **Dowicide A-hexamine.** Fruit treated by exposure to approximately 2 percent Dowicide A, 1 percent hexamine, and 0.05 percent palmolive soap in the dip tank. Later the fruit was waxed and polished, and sorted for size and soundness.
4. **Borax-Dowicide A-hexamine.** Fruit treated by exposure to 5 percent borax in dip tank; 24 hours later treated with Dowicide A and and hexamine as described in treatment 3; waxed, polished, and sorted for size and soundness.

Sufficient fruit was used to pack 32 1-3/5-bushel Bruce boxes for each treatment. The 32 boxes were subdivided to make 16 boxes packed naked and 16 boxes packed with phenodor liners. The use of phenodor liners made eight different treatments of comparable fruit available for storage at Orlando and New York. Two boxes representative of each treatment were thus available for inspection at each location at the end of eight, twelve, and sixteen weeks' storage respectively.

The test fruit consisted of Valencia oranges grown on sour orange rootstock. It was picked on May 7, packed on May 7 and 8, and placed in storage at Orlando, May 9.

The test boxes for storage at New York were shipped in a commercial carlot on May 11. The packed boxes were precooled 24 hours. Between the time of packing and shipment, fruit temperatures averaged 70°F., and during the transit period 56°. They were stored at New York on May 15.

RESULTS

Comparison of Prestorage Treatments and of Phenodor Liners on the Control of Decay

The Dowicide A-hexamine treatment followed by the use of phenodor liners gave excellent control of decay both at Orlando and New York City. This combination of treatments was even more effective when preceded by a borax dip. Thus, where borax-Dowicide A-hexamine dips were used along with phenodor liners oranges stored at New York City showed only 1.5 percent decay after sixteen weeks at 32° followed by seven days at 70°F.; and oranges stored under the same conditions at Orlando showed no decay. It will be seen from the data therein that in only one instance out of eighteen sets of comparisons did the Dowicide A-hexamine treatment when used alone fail to give good control of decay. This exception occurred in the New York City lot that was stored for sixteen weeks followed by seven days at 70°.

The Dowicide A-hexamine treatment and the borax-Dowicide A-hexamine treatments (numbers 3 and 4) greatly reduced decay when comparison was made with the unwashed and washed fruit. In this connection it should be pointed out that less decay developed in the washed fruit than in the unwashed fruit. The results were more striking in the sixteen weeks' than the eight or twelve weeks' storages.

The use of phenodor liners increased the effectiveness of both of the fungicidal treatments (treatments 3 and 4) in reducing the comparatively small amounts of decay found during the holding period at 70°F. (See figure 2.) The unwashed and the washed fruit

(treatments 1 and 2) also responded remarkedly to the use of phenodor liners and the findings showed a consistent reduction of decay in most of the inspections.

Throughout the entire test the amount of decay that developed during storage was influenced by the length of the storage period. In other words, more decay developed after twelve weeks' storage than after eight weeks' and more after sixteen weeks' than after twelve weeks'. Decay likewise increased as the fruit was held at 70° following removal from cold storage. In general, less decay developed in the fruit stored at Orlando than in that stored at New York City.

Phenodor liners had no significant effect on aging; the differences were small and inconsistent. Prestorage packinghouse treatments on the other hand did influence the amount of aging found on the fruits. The results are shown in table 5. It will be noted that the smallest amounts of aging occurred in the washed fruit (treatment 2), and the greatest amount (1 to 8 percent) in the lots treated with Dowicide A-hexamine.

There was evidence at Orlando that some rind burn resulted from the Dowicide A-hexamine treatments. The injury was mostly around the stem end of the fruit and this was classified in the category of "aging."

Skin breakdown in the form of storage pitting was of minor commercial importance. It should be pointed out that somewhat more pitting was in evidence in the fruit stored for sixteen weeks, than in that stored for eight or twelve weeks. There was a rather consistently smaller amount of pitting in the boxes with phenodor liners than in those of the naked-packed boxes. This undoubtedly was due to the greater prevention of rind dehydration in the lined box.

In the studies at Orlando the loss in weight of the fruit was determined. It was found that the average percent loss amounted to 2.7, 3.5 and 4.1 after eight, twelve, and sixteen weeks' storage, respectively. Prestorage packinghouse treatments had only a slight effect on loss in weight and the average percentages ranged btween 3.3 and 3.6 among the treatments. The loss in weight for all periods of storage amounted to 4.2 percent in the naked packs and 2.7 percent in the phenodor-liner-packs. From these figures it can readily be seen that the phenodor liners were effective in reducing the loss in weight of the fruit during storage.

Throughout the entire storage test the unwashed fruit had a duller, less attractive appearance than did the fruit of the other three treatments. The oranges that were not decayed were still fairly fresh in all treatments and were fairly firm even after sixteen weeks' storage.

Comparison of the Phenodor-Treated Corrugated Fiberboard Carton With the Phenodor Liner for the Control of Decay

A series of storage tests was conducted at Orlando, Florida, in which comparisons were made between the 4/5-bushel phenodor-treated fiberboard container and the phenodor box liner. The two lots of fruit were of the same crop and were packed by the same shipper. Each subsample usually consisted of three boxes of oranges. Storage was at 32°F. for periods of eight and twelve weeks. Inspections on the fruit were made at the end of each storage period and again after holding three and seven days at 70°.

The results show good control of decay during storage of eight weeks and twelve weeks at 32° from the treated cartons and the treated liners. At the final inspection less decay was found in cartons than in lined boxes of oranges.

Effect of Grove on Storage Quality

Storage tests were made to determine the variation in keeping quality of oranges from various groves. The test lots consisted of fruit from ten different groves and were stored for eight and twelve weeks at 32°F. Each subsample consisted of two or three boxes of fruit representive of the quality and pack going to market. The fruit was inspected at the end of each storage period and also after three and seven days at 70°.

The results show that very small amounts of decay developed in storage, or after three days at 70°F. However, considerable variations in the amounts of decay were evident after seven days at 70°, especially in the fruit that was stored for twelve weeks. There were comparatively small percentages of total of decay in lots H, I, and F, while higher percentages of decay were found in B, G, E, and C.

Effect of Size of Fruit on Decay in Storage

Storage studies were conducted to determine the effect of size of fruit on storage quality. The subsamples consisted of three boxes of fruit of each of the following sizes: 126, 150, 176, 200, 216, and 250. They were stored for eight and twelve weeks at 32°F. The oranges were inspected at the end of each period and twice after transfer to 70°.

The data show that little decay developed in storage. There was a small increase in total decay after holding three days at 70°F. However, decay increased rather rapidly in some of the lots by the end of seven days at 70°, especially those stored for twelve weeks. The greatest amount of decay was found in large sizes (126 and 150). No significant differences were noted in sizes 176 to 250. These findings are in fair agreement with those of 1950, when it was found that the highest amounts of decay occurred in the very large fruit, while the lowest amounts occurred in the small fruit.

Relation of Rootstock to Storage Behavior

Tests were made at Orlando, Florida, to determine the keeping quality in storage of fruit grown on rough lemon, sour orange, and sweet orange rootstocks. Storage was for eight and twelve weeks at 32°F. The fruit were inspected at the time of removal from storage and after three and seven days at 70°

Packinghouse treatments were the usual ones. The fruit was washed, waxed, and polished. Each subsample consisted of three boxes of fruit.

The results show that the rootstocks on which the oranges were grown affected the total percentage of decay. The amount of decay was low at the time of removal from storage. It may be observed that a slightly higher percentage of decay was found after the three-day holding test, and a still greater amount after seven days at 70°F. More decay developed during the seven-day holding period in fruit stored twelve weeks than in that stored eight weeks. Rootstocks affected the total decay of the fruit and there was more decay in fruit on rough lemon than sour or sweet orange. The differences in storage behavior between fruit on sour and sweet orange rootstocks were small and insignificant. The results further show that aging and storage pitting were unimportant and that the small amounts found were not

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Effect Of Various Treatments Of Decay In Tangerines

Effect of Packing-House Treatments, Temperatures in Transit and Containers on Decay in Tangerines

(PART THREE)

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Inasmuch as interest has been shown by the citrus industry in fiberboard containers for citrus fruits, results obtained several years ago from shipping tests with tangerines in fiberboard containers may be appropriately presented here.

Two shipping tests were made in which tangerines packed in standard nailed crates were compared with perforated, fiberboard cartons of similar capacity. The inside dimensions of the cartons used in the first test were 19-1/8 inches by 9-½ inches by 9-½ inches. The crates were loaded on end in the rear end of the car in the usual pattern of 8 rows, 3 layers and 20 stacks. The cartons were loaded nine rows wide in six layers, nine stacks long in the "head" or front end of the car, and car strips were placed between each layer. While this was a snug load, it was not tight enough to close all vertical air channels between each row of packages. Car strips were nailed to the crates in the usual manner while cartons were not secured to the strips.

This test was made from Polk County, December 9, 1942, with ethylene-treated tangerines loaded in ART 22507, a non-fan car, and shipped under standard ventilation to New York where it was unloaded five days later. The commodity temperature at loading time averaged 72°F. and at unloading ranged from 42° to 48° in the crates and from 38° to 54° in the cartons. The outside air temperatures were within a few degrees of normal until after the car arrived at destination. The fruit in the crates in the top and middle layers cooled at a rather uniform rate of 5 to 8 degrees per day for a total average reduction of about 27 degrees. The top crate was from 3- to 6-degrees warmer than the middle crates during the greater part of the trip. The fruit cooled more slowly in the cartons than in the crates and there was little change in temperature in the top and middle layer until the second midnight after loading. Thereafter, cooling progressed at a rate of about 5 to 6 degrees per day for a total average reduction during the transit period of about 22 degrees in the cartons whereas there was about a 27 degree reduction in the crates placed in similar positions.

The evaluation of decay development was made from a cross section inspection of the general load in each type of container as well as from three test crates, and from a similar number of cartons from each of three groves.

When unloaded five days after loading there was less than 1 percent decay (mostly stem-end rot) in that part of the general load packed in crates and three times that amount in the fruit packed in cartons. There was less than 1 percent total decay, mostly stem-end rot, in test crates and 2.1 percent total decay in the test cartons of which less than 1 percent was green mold rot and the remainder was stem-end rot.

After the test packages were held one week at room temperature decay had increased to 15.1 percent in the crates of which 4.1 percent was green mold rot and the remainder was stem-end rot. At the same time there was 14.0 percent decay in the cartons of which 3.7 percent decay was green mold rot and the remainder was stem-end rot.

A few weeks later standard nailed crates were compared with cubical fiberboard cartons of similar capacity for use with tangerines. In this test the fiberboard cartons had an inside dimension of 12½ inches by 12½ inches by 12½ inches.

For this test, FGE 66469, figure 12, a pre-iced fan car, was loaded in Pasco County, February 10, 1943, and the fan lever placed at the "on" position. The "head" or front end of the car was loaded with fiberboard boxes in seven rows, five layers, and fourteen stacks, thus giving a one-inch space between rows. Two car strips were placed horizontally between each layer where a small block one inch by four inches was tacked to car strips and dropped into place, each separator block making contact with four cartons. The purpose was to separate each box to afford a continuous vertical air channel.

The rear end of the car was loaded with the standard nailed crates placed three high on end with the usual car stripping between each layer in eight rows and twenty stacks.

Immediately after adding 300 pounds of salt to the ice bunkers the car was pre-cooled for six hours with a General American Product Conditioner, ending during the early morning hours the day after loading. The first reicing in transit took place in the afternoon the day after loading. The car was shipped under standard refrigeration to New York City where it was unloaded seven days later with bunkers nearly full of ice, soon after a period of sub-zero weather there.

There was very little difference in temperature between the crates and cartons in the top layer, however, the temperatures in the middle of the load were approximately 8 degrees higher in the fiberboard boxes than in the crates during most of the transit period. At the bottom bunker location the crates remained cooler than the cartons by 5 or more degrees.

Although the load was subjected to very low outside air temperature and the bunkers were almost full of ice at unloading, no indication of frost damage was noted in any part of the car.

The tangerines in both cartons and crates, in the commercial load arrived in very fine condition. Decay ranged from 0- to 4-percent, averaging 1.2 percent in the cartons and 1 percent in the crates.

At unloading there was no decay in the test crates and less than 1 percent decay in the test cartons. After one week holding at 70° there was from 15 percent to 19 percent decay in the crates and 15 percent to 16.5 percent in the cartons. Practically all of the decay was green mold.

Two shipping tests in non-fan cars were made with tangerines loaded in Lake County on January 22, 1946, in cars in which most of the lading was packed in wire-bound crates. Some crates were lined with diphenyl-treated liners while others had spongy blankets consisting of multi-layers of crepe paper heavily impregnated with diphenyl between each layer of fruit. The first car, SFRD 19262, loaded with 803 crates four and five layers high with an average temperature of 67° was shipped to Jersey City under standard ventilation; the second, PFE 28215 with 855 crates with an average temperature of 66° loaded five high throughout was shipped to Washington, D. C., under standard refrigeration. Unfortunately there was no record of temperatures within the cars during the transit period since no recording thermometers were available for use then.

When the cars were unloaded at destination the car given standard ventilation had an average of less than ½ of 1 percent decay in the test crates regardless of treatment. After one week at 70°F., decay in the naked pack check lot averaged 6.6 percent, in the crates with diphenyl-treated liners 11.2 percent, and 3.4 percent in the crates with diphenyl-treated blankets between each layer of fruit. Practically all of the decay was caused by green mold.

An informal inspection of the general load of the car given standard refrigeration was made during unloading by the inspection service. No decay was found in the naked pack, and from 1 to 13 percent green mold in the crates lined with diphenyl-treated paper. In none of the test crates was there as much as ½ percent decay on arrival but after holding test packages for one week at 70°F., 7.7 percent decay was found in the naked pack; 8.7 percent in the crates with diphenyl-treated liners; 8.2 percent in the crates with diphenyl-treated liners plus separators, i.e., one sheet of diphenyl-treated Kraft paper per crate; and 6.8 percent decay in the crates with diphenyl-treated blankets between each layer of fruit. Again practically all of the decay that developed during the week after unloading was caused by green mold.

The result of this test lends support to the conjecture that the liners made a rather tight package which probably held a higher relative humidity and also delayed cooling, thereby favoring the development of green mold to such an extent as to counteract the benefit of diphenyl.

DISCUSSION

Perhaps the greatest deterrent to extending the marketing period, wider distribution, and better prices for tangerines is the amount of decay that develops as the fruit ripens. Not infrequently when the fruit is ripe more than 50 percent decay may be expected to develop within a week after the fruit reaches market.

Tangerines are so tender that the skin is easily torn during picking. Likewise, they are so easily bruised that it is perhaps impossible to handle them by present picking and packing methods, without causing considerable injury to the rind and, thereby, paving the way for ready entrance of rot organisms such as the green mold fungus.

Unless radical changes are made in the general direction of careful handling all along the line from tree to table, the shipper and consumer alike may with valid reason expect decay to develop in disastrous proportions within a few days after a shipment of tangerines reaches market. This should be expected even when the fruit reaches market in apparently sound condition. Probably the first corrective step is packinghouse machinery designed especially for tangerines, a commodity which when ripe, is almost as tender as a red-ripe tomato or a mellow-ripe peach. The riper the fruit, the more tender it becomes and the greater the amount of decay.

It has long been known that the ethylene treatment for degreening citrus fruits accelerates stem-end rot and reduces green mold decay somewhat, resulting in a net increase in decay. Especially noteworthy was the relatively small amount of green mold and large amount of stem-end rot in the test lots of ethylene-degreened tangerines held at Orlando as well as in the test shipments to auction markets. Green mold accounted for a very large proportion if not practically all of the decay that developed in non-degreened tangerines within a week or ten days after packing, whether held under observation at Orlando or shipped to market. This fungus grows very rapidly at temperatures in the low 70's and under favorable conditions can develop into visible decay within three or four days after the fruit is injured and completely rot the fruit within a week. In retarding decay in tangerines, 50°F. proved to be much less effective than was 38°.

After removal from low temperature there was a margin of about three days before decay had increased excessively. The effect of low temperature on decay was largely spent within one week at room temperature, hence it appears that low temperatures merely retard the development of decay while the commodity is so cool that rot fungi grow slowly if at all. Too often the effect is to pass the burden of decay on to the receivers or consumers.

Certain chemical treatments applied to citrus fruits in packinghouses are capable of checking the development of decay not only during the transit period but for a considerable period thereafter provided the rot organisms have not become deep-seated before the fruit is treated. Such antiseptics as Steriseal and Dowicide-A plus Hexamine applied in a liquid state to fruit before packing were effective in checking rot development, the latter being more effective than the former for a week or two, but neither gave sufficient control.

Decay was not further reduced when Dowicide-A plus Hexamine treated fruit was packed in diphenyl-treated fiberboard cartons, yet diphenyl made its original reputation as an inhibitor of green mold in oranges when the fruit was packed in treated wraps. The failure of diphenyl-treated cartons to control green mold seems to be more likely due to higher humidities in the tight packages rather than to a loss in effectiveness of the chemical.

Shipping tests under standard refrigeration to such distant markets as Los Angeles and Seattle demonstrated that sound delivery of tangerines can be made to markets that are some ten to fourteen days distant. Most of the test shipments were made in cars equipped with Preco car fans. How-

(Continued on page 12)

New Research Divisions To Study Citrus Problems

Two new research divisions have been formed at USDA's Southern Regional Research Leboratary in New Orleans, La., Dr. C. H. Fisher, Director has announced. The formation of these new divisions is in conformity with the plans of Dr. G. E. Hilbert, Chief of the Bureau of Agricultural and Industrial Chemistry, which operates the Southern Regional Labortary, for an organization that will permit more effective prosecution of research in southern-grown oilseeds, fruits, and vegetables.

The new Oilseed Division, headed by Dr. A. M. Altschul, was made by merging the Oil and Oilseed Division, a portion of the Protein and Carbohydrate Division of the Southern Laboratory, and the U. S. Tung Oil Laboratory, Bogalusa, La. F. G. Dollear will serve as Assistant Division Head. The new Fruit and Vegetable Division, headed by Dr. V. H. McFarlane, consists of a newly formed Biochemical Section under J. C. Arthur, Jr., at the Southern Laboratory, and three field stations: The U. S. Fruit and Vegetable Products Labortary, Weslaco, Texas, under its new head, Dr. Francis P. Griffiths; the U. S. Citrus Products Laboratory at Winter Haven, Fla., under Dr. M. K. Veldhuis; and the U. S. Food Fermentation Laboratory, Releigh, N. C., under Dr. John L. Etchells.

Research will be continued by the new Oilseed Division to find more effective ways of utilizing cottonseed, peanuts, tung, and other southern oilseeds, including; determination of the properties and composition of oilseeds and derived products; chemical modification of oils and proteins; improvement in the quality of oil and meal through better methods of processing; handling and storage of cottonseed, tung, and rice; and processing of peanuts for edible uses. Its work will be coordinated with that of the Engineering and Development Division under E. A. Gastrock and that of the Analytical, Physical-Chemical, and Physics Division under T. H. Hopper.

The Fruit and Vegetable Division will be concerned with the utilization of fruit and vegetable

U. S. Department of Agriculture
Bureau of Agricultural and Industrial Chemistry

products, including bacteriological, biochemical, and processing research to develop new and extended uses for citrus fruit and vegetables of the Southern Region, especially oranges, grapefruit, sweet potatoes, and cucumbers, and their derived products.

Dr. K. S. Markley, who directed the research of the former Oil and Oilseed Division, recently accepted a position as Processing and Development Consultant with the Institute of Inter-American Affeirs, Asuncion, Paraguay. He is a world authority on oil and oilseed chemistry and technology and author of many scientific and technical papers. He had been a member of the Southern Labortary staff since October 1939 and of the Department since 1921. Dr. Markley represented USDA at international scientific conferences held in London, Lucern, Zurich, and Mexico City, and has made technological surveys of the oil and oilseed industries of Germany and Northwest Europe for the Army, and of Venezuela, Guatemala, and Paraguay for the United Nations.

Dr. C. H. Fisher, Director of the Bureau's Southern Region, has announced the appointment of Dr. V. H. McFarlane to head the new Fruit and Vegetable Division. Dr. McFarlane, formerly in charge of the Biochemical Section of the former Protein and Carbohydrate Division, has directed microbiological research on fruits, vegetables, and other agricultural products. J. C. Arthur, Jr., in charge of the Biochemical Section of the new division, was formerly in charge of the Products Section of the Protein and Carbohydrate Division. He has done extensive research on sweet potatoes and oilseed proteins. F. P. Griffiths, new head of the U. S. Fruit and Vegetable Products Laboratory at Weslaco, Texas, is a food technologist and specialist in fruit and vegetable investigations from the Western Regional Research Labortary, Albany, California. He succeeds W. C. Scott, who will assist with the development of the citrus program at the U. S. Citrus Products Laboratory in Winter Haven, Fla.

V. H. McFarlane, head of the new division, is a native of Washington. He received his B. S. degree at Whitman College, Walla Walla, Washington, in 1927 and his Ph. D. in Basteriology from the University of Washington in 1938. Later, he completed 2 years additional studies in bacteriology and biochemistry at the University of Wisconsin. Dr. McFarlane has been active in agricultural research since 1935 when he joined the staff of the U. S. Frozen Pack Laboratory, USDA Bureau of Chemistry and Soils in Seattle, Washington. He has directed or conducted microbiological investigations on frozen fruits and vegetables; unfermented fruit juices; sweet potatoes; egg and egg products including dried eggs; processing plant sanitation; and rice. He is the author of many publications devoted to food research.

J. C. Arthur, Jr., is a native of Texas. He received his B. A. degree at Stephen F. Austin State College in 1939 and his M. A. degree at the University of Texas in 1946. He completed additional studies in biophysics and biochemistry at Tulane University and studied the use of isotopes in scientific research at Oak Ridge Institute for Nuclear Studies. Mr. Arthur joined the staff of the Southern Regional Research Laboratory in 1941. He brings 3 years' experience in sweet potato research to the new division plus 8 years' experience with vegetable proteins and physical chemical methods. Mr. Arthur has several publications and patents, principally in the field of protein chemistry.

F. P. Griffiths, a native of Washington, obtained his B. S. degree at the University of Washington in 1927 and his Ph. D. in Chemistry and Bacteriology at Massachusetts State College in 1935. From his position of Professor and Acting Department head of Food Technology at Amherst from 1942-45, he became Director of Research of

(Continued on page 11)

Amazing New Plant Food Material To Be Handled By Tampa Firm

"Ferro-Sene"* Found Beneficial in Treatment of Iron Chlorosis in Citrus Trees.

Iron Versenate, or "Ferro-Sene"* has been developed as a result of work at the Citrus Experiment Station at Lake Alfred. When properly used in small quantities to treat iron-deficient citrus trees and other plants or other crops, it has proven remarkably beneficial. The Bersworth Chemical Company, of Framingham, Massachusetts, manufacturers of the new product, announces that the Lyons Fertilizer Company of Tampa has been appointed Sales Agent for Florida. Lyons will distribute 'Ferro-Sene"* for direct use on the soil or as a soil amendment in fertilizers.

However, it must be remembered that for the time being "Ferro-Sene"* should only be used on a trial or experimental basis. The work is still quite new and its implications have not yet been fully determined. Hence, it is strongly recommended the "Ferro-Sene"* (iron Versenate) should be used only on trees suffering severe iron deficiency. What's more, it should be applied according to the suggestions made by the Citrus Experiment Station as outlined on page 22 of the June issue of 'Citrus Magazine."

"Ferro-Sene"* is available for sale through Lyons Fertilizer Company. The use of chelated compounds such as this, offer an entirely new approach to plant food problems. Some amazing results have been achieved with them. "Ferro-Sene"* is offered for agricultural use without warranty, express, or implied.

* Trade Mark applied for.

NEW RESEARCH DIVISIONS TO STUDY CITRUS PROBLEMS

(Continued from page 10)

G. L. Cabot, Inc., in McAllen, Texas. He joined the staff of the Western Regional Research Laboratory in 1946, where he was serving as a special assistant to the Director when appointed to his new position.

W. C. Scott, a native of Texas, obtained his B. A. degree in 1928 and his M. A. in chemistry in 1939 at Hardins Simmons University. Mr. Scott joined the Fruit and Vegetable Labortary in 1935, and has headed the Labortary since 1941. His extensive experience in citrus products technology makes him especially qualified to take a major part in the intensified research program at the U. S. Citrus Products Laboratory in Winter Haven, Florida.

CONTROL OF DECAY OF FLORIDA ORANGES DURING STORAGE

(Continued from page 7)

closely related to rootstocks.

Commercial Storage of Six Carloads of Orange

A study was made on the commercial storage of six carloads of oranges in the same manner as during the previous season. Although the cars were handled in a strictly commercial manner, complete records were taken from the time the fruit entered the packinghouse until it was removed from storage and sold.

One carload packed in Bruce boxes with phenodor (diphenyl-treated) liners was stored at Providence, Rhode Island, April 26, and sold in early July after nine to ten weeks' storage at about 32°F. Sample boxes examined on four occasions, either in storage or at New York City where they were delivered by refrigerated truck, remained in good condition without developing an appreciable amount of skin breakdown. An average of 3 percent decay was found after six weeks, and 4.6 percent after nine weeks' storage. No further records were obtained, but it was understood that the carload was to be placed on sale soon after the time of the last inspection.

Four carloads packed either in standard or Bruce boxes, were placed in storage at New York City (Newark, N. J.) between May 7 to June 4, removed between June 21 to July 12, after four to seven weeks' storage at about 32°F. Phenodor liners were used in two loads; and the fruit was packed in two diphenyl-treated paper bags per Bruce crate, with the bags separated by a center partition in a third load. Inspections were made at the time of storage, during the storage period, and on the New York City sales pier. Decay at the time of arrival at storage ranged from a trace to 1 percent and at the time of removal from a trace to 3.5 percent. Except in one carload, where 7.3 percent skin breakdown was found at the time of sale, neither aging nor pitting developed to an important extent during the storage period.

Since all four cars were sold at auction, price comparisons can be made between date stored and date sold. All figures are taken from the New York Daily Fruit Reporter and are for the variety and pack represented in the test car.

Car 1, containing brands A, B, and C, was stored May 7, on which date 13,300 standard boxes of Indian River Valencias were sold at $4.55 per box. Four cars of the same brands as those in the test car were sold on May 7:

Brand A sold at $5.33, B at $4.47 (1 car only), and C at $4.43 per box.

The test car was sold June 21 for the follwoing prices per box: A at $5.03; B at $4.00, C at $3.97.

Another car, containing two of the same brands, was sold on June 21 as follows: Brand A at $5.43, C at $4.27. The fruit in this carload had been picked later than that in the test car and had been held in storage at Jacksonville, Florida, for one week; the fruit had a fresher appearance and less decay than that in the test car (3 percent decay in latter). On June 21, 3,830 stndard boxes of Valencias were sold at $4.81.

Car 2 was stored May 15, on which date 4,210 Bruce boxes of Valencias were sold at $4.88.

The test car was sold on June 21, at $3.31. This car was the one with 7.3 percent skin breakdown and was also the one in which the oranges were packed in two paper bags per Bruce box with a partition. Another car of the same brand as that stored was sold on the same date at $5.10. A total of 5,960 Bruce boxes of Valencias sold on June 21 at $4.36.

Car 3, containing brands A, B, and C, was stored May 22, on which date 7,505 standard boxes of Indian River Valencias were sold at $4.98. Three cars of the same brands as in the test car were sold on May 22 for: Brand A at $5.49, B at $4.92, C at $4.64.

The test car was sold July 12 for the following: Brand A at $5.62, B at $4.90, C at $4.35. On the same day 2,640 standard boxes of Indian River Valencias were sold

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CONTROL OF DECAY OF FLORIDA ORANGES DURING DECAY

(Continued from page 11)

at $4.71.

Car 4 was stored June 4, on which date 15,770 Bruce boxes of Valencias were sold at $3.87. A carload of the same brand as that in the stored car was sold on June 4 at $3.82.

The test car was sold July 3 at $1.58. The fruit had a good appearance, although it contained 3.5 percent decay. On the same date 2,665 Bruce boxes of Valencias were sold at $3.12. The comparatively low price received for the stored carload cannot be attributed to the condition or appearance of the fruit. It may be pointed out that the day of sale immediately preceded the July 4 holiday and the market was slow.

Another carload of Valencia oranges, stored at New York City (Newark, N. J.) in cooperation with the Citrus Container Institute, consisted of 1,056 corrugated phenodor-treated fiberboard cartons of 4/5-bushel size. The fruit itself had received the Dowicide A-hexamine fungicidal treatment. The cartons were loaded in a fan car in such a manner as to provide vertical "chimneys" to facilitate transit cooling. The load was precooled on track for 24 hours by means of car fans, shipped under standard refrigeration, and unloaded into storage five days after the end of the precooling period.

Fruit temperatures at the time of loading ranged from 8° to 92°F. and averaged 86.4°. Fruit temperatures were taken manually while the car was being unloaded by cutting a slit in the carton and inserting a fruit thermometer into an orange adjacent to the carton wall. Temperatures were several degrees higher in oranges adjacent to walls farthest removed from the chimneys than in oranges adjacent to carton walls forming the inner wall of the chimney. Top layer temperatures ranged from 55° to 60°F., middle layer from 59° to 69°, and bottom layer from 47° to 51°. The average of 32 readings in the load was 58°. There was considerable variation in the amount and degree of aging and pitting at several inspections made during the storage period although there was no evidence that it became worse during storage. In this connection it should be noted that the carlot was pooled from seven sources. Only 1.3 percent decay was found at the end of a six-week storage period.

On the day the car went into storage (June 18) 9,520 Bruce boxes of Valencias were sold at $4.93 each. The test car was sold on August 1 at $2.64 per carton, equivalent to $5.28 per Bruce box. On the same day 4,080 Bruce boxes were sold at $6.23 each.

EFFECT OF VARIOUS TREATMENTS OF DECAY IN TANGERINES

(Continued from page 9)

ever, one was with a non-fan car that had its lading thoroughly precooled after loading.

Ample evidence has been obtained from shipments of oranges and grapefruit in fan cars during the cooler months to justify the conclusion that Rule 251 i.e. initial and one reicing gives essentially the same temperatures for at least four or five days as standard refrigeration during the period when tangerines are being shipped in quantity. It seems quite probable that initial ice and one re-icing in transit, or initial ice, replenishment after precooling and one re-icing would be adequate for transcontinental shipments of tangerines in fan cars, moving in cool weather.

Sound delivery of both precooled and non-precooled fruit in pre-iced fan cars given standard refrigeration was also made to such markets as Chicago and New York. In these shorter hauls, all in fan cars, precooling after loading did not result in less decay than in non-precooled fruit.

The value of refrigeration in transit in warmer than normal winter weather was demonstrated in the cars shipped to auction with dry bunkers under ventilation when compared with initial icing given after loading and one re-icing en route.

The difference in temperature between loads of cartons and crates may have been due in part to the none too uniform vertical air channels between the rows of cartons. The observed differences in temperature probably were not of sufficient magnitude or duration to single-handedly have had much effect on the carrying quality of tangerines. Doubtless higher humidity prevailed in the cartons thereby serving to expedite the rot organisims.

SUMMARY

Such antiseptics as Steriseal and Dowicide A plus hexamine applied during the washing period, were effective in retarding the usual decay for a week or two after application.

Decay development was as rapid in diphenyl-treated cartons as in naked-packed wirebound crates.

Based on holding tests, at Orlando as well as at auction markets, the receiver has about three days in which to dispose of his fruit before decay becomes excessive. In a week after unloading, the beneficial effects of low temperatures during transit were largely spent.

Precooled tangerines shipped in fan cars under standard refrigeration as far as Seattle and Los Angeles arrived there from ten to fourteen days later in sound condition. Both precooled and non-precooled tangerines in fan cars reached New York in sound condition. Decay developed rapidly in tangerines after they reached market.

ACKNOWLEDGEMENTS

The generous cooperation received from American Fruit Growers, Alturas Packing Company, Atlantic Coast Line Railroad, Atlantic Commission Company, Auster Company of California, Dennis Brokerage Company, East-West Produce Company, Egan-Fickett & Company, Florida Citrus Exchange, Fosgate Growers Cooperative, Growers and Shippers League of Florida, McBride Packing Company, New York Fruit Sales Company, Orlando Citrus Growers Association, Pacific Fruit and Produce Company, Pasco Packing Company, Dr. P. Phillips Company, Pioneer Fruit Company, Polk Packing Association, Safeway Stores, Seaboard Airline Railroad, Steinhardt & Kelly Company, Waverly Growers Cooperative, and Williams Brothers, is hereby acknowledged. Through their efforts the shipping tests were made possible.

Employees of the Fresh Products Standardization and Inspection Division of the Production and Marketing Administration of the U. S. Department of Agriculture who made inspections at destination were: Wm. B. Brooks, Seattle, Washington, C. B. Woolley, Portland, Oregon, W. J. Bertush, and C. D. Williams, Los Angeles, California. Co-workers in the Division of Handling, Transportation and Storage of the Bureau of Plant Industry, Soils and Agr. Engineering who gave assistance are Edwin Smith, Wenatchee, Washing-

ton, E. M. Harvey, Pomona, California, G. B. Ramsey and M. A. Smith, Chicago, Illinois, J. S. Wiant, J. Kaufman, B. A. Friedman and W. A. Radspinner, New York, New York, J. S. Cooley and L. P. McCulloch, Beltsville, Maryland, and G. A. Meckstroth and A. B. Walton, Orlando, Florida.

STATION ISSUES INSTRUCTIONS ON USE OF PARATHION

(Continued from page 4)

Blood Submitted for Estimation of Cholinesterase

1. Send to laboratory by quickest means of transportation. Courier is best, next bus. Have bus notify laboratory on arrival.
2. The correct amount of heparin should be used as an anticoagulant as too much will tend to hemolyse the blood. This amount is:
   1 drop of heparin (1,000 units per cc.) for 1 cc. of blood, or 1/10 cc. for 3 cc. of blood. Mix the blood gently.
3. Contact the laboratory before having blood samples taken.

Laboratories Which have Been Operating for some Time and Thoroughly Checked Out Are as Follows:

Dr. Williams, Clinical Laboratory, Morrell Memorial Hospital, Lakeland, Florida.

Mills-Paterson Clinic, 706 Franklin Street, Tampa, Florida.

Dr. A. E. Cronkite, Clinical Laboratory, Room 203, Sweet Building, Fort Lauderdale, Florida.

The Following Newer Laboratories are being Setup, Checked, and Equipped.

Mr. Bill Chehy, Mr. Jim Arnold, Clinical Laboratory, Monroe Memorial Hospital, Ocala, Florida.

Dr. Wm. W. Schildecker, Clinical Laboratory, Halifax District Hospital, Daytona Beach, Florida.

Louis C. Herring, Analytical & Clinical Lab., 1219 Kuhl Ave. Orlando, Florida.

FRUIT GROWERS AND CONSUMERS BENEFITING FROM POINT 4 PROGRAM IN LEBANON

Fruit growers, shippers and consumers all will benefit from a project being carried on jointly in Lebanon by the Ministry of Agriculture and a Point 4 Farm and Marketing specialist. Demonstrations are being held showing fruit pickers how to use specially made clippers and picking bags brought from the United States. They also are being shown how properly to classify and pack fruit—particularly citrus fruit—for shipping. The American technician is V. V. Bowman from Falls Church, Virginia.

Since Lebanon citrus men experience heavy losses as a result of careless picking, handling, selection and packing of fruit, Mr. Bowman followed one fruit shipment to Greece to study the causes of damage and methods of prevention. It was found that the losses ranged from 8.5% to more than 10% for lemons, most of which could be prevented by greater care in selecting and packing the fruit.

Most orange pickers in Lebanon have been using pruning shears which were not designed for that purpose. Two clips are required, and the skins of the fruit are often bruised or cut in the operation, causing eventual decay. The new clippers, which have curved blades, remove the orange with only one clip and with little danger of damaging the fruit.

Specially made canvas sacks have been brought in from the United States for the use of pickers instead of the baskets to which they are accustomed. The advantage of the sacks over the baskets is that the pickers can carry a much greater load, the sacks open at the bottom for delivery of fruit into the boxes without bruising, and the picking operation is speeded up.

Rashid Ldriss, export specialist of the Lebanese Ministry of Agriculture, has been assisting in the demonstrations and has made the clippers and sacks available to fruit growers on a loan basis until such time as purchases in quantity can be made in the United States. Exporters and pickers are enthusiastic about the new equipment and methods which should result in great savings by reducing losses due to faulty handling.

One fruit grower, impressed with Bowman's work, termed the demonstrations a good example of technical assistance under the Point 4 agreement between Lebanon and the United States.

JACKSON 4-H MEMBER AWARDED SCHOLARSHIP

Edwin Duce, 18-year-old Jackson County 4-H club boy, has been awarded a 1952 Winn-Lovett $1,000 scholarship for outstanding work and leadership in Florida 4-H clubs.

The scholarship pays $250 per year for four years and with it Duce will enter the University of Florida College of Agriculture this fall.

The LYONIZER

Department

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

REPORT FOR THE LYONIZER POLK AND HIGHLANDS COUNTIES

by

J. T. Griffiths and J. K. Enzor, Jr.

Most growers in Polk County will have completed their oil sprays by the end of July. Where Parathion is being used some sprays will be applied in August. Rust mites have been quite active and many growers have already started their summer sulfur sprays. Groves should be carefully checked and sulfur applied when rust mite appear.

Although numerous grapefruit groves failed to set a satisfactory crop this spring, late bloom has been scarce and it now appears that there will be only a small amount of late bloom grapefruit in this area.

NORTH CENTRAL FLORIDA

V. E. Bourland

Weather conditions have been somewhat unsettled, some sections it rains while others stay dry, it seems we can't get a good general rain. Groves are looking very good, and fruit is sizing nicely, although there has been lots of oil spraying for scale and dusting for rust mite this summer. Young trees are being hoed, worked, and fertilized. Some seed beds and preparations are being made for fall truck crops.

WEST CENTRAL FLORIDA

J. E. Mickler

Pasture men this month have been busy in combining Pensacola Bahia seed, and the returns have been very good. Grasshopper trouble beset many pastures, and spraying or dusting by airplane proved to be successful in saving the seed crops. Top dressing is now in progress to bring a second crop. Yields have been better than average this year and prices are holding steady at present. Groves are being sprayed to check any scale condition which is very light so far.

Dust programs will begin soon to check Rust Mites which have shown evidence of being plentiful.

SOUTHWEST FLORIDA

Eaves Allison

The citrus crop is sizing up well in this area with ample rains beginning early in July supplying all moisture needed. Tree growth and color on most groves is satisfactory, however a few are showing the yellow color of malnutrition reminiscent of the old days of twelve cent grapefruit and thirty cent oranges. Ample Lyons fertilizer would soon change this.

Vegetable growers are getting caught up on their fishing and vacation trips, with some activity being shown in land clearing operations. Bulb growers are just now digging the last of their bulbs remaining in the fields.

All-in-all, another season of unpredictable results is about to roll around. As usual some will find it good, some bad.

SOUTH POLK, HIGHLANDS, HARDEE AND DESOTO COUNTIES

C. R. Wingfield

The moisture condition has been satisfactory in all sections and Citrus groves have responded to the last application of fertilizer. The color of the foliage is good and the fruit has sized well for this time. Where crop is extremely heavy a supplyment of Nitrogen might be needed to insure a better size. The crop appears to range to fair to good. Some Pineapples and Valencias were late being moved and this has reflected somewhat in the growing crop.

There is much activity in the control of various insects. Both Purple and Florida Red Scale have been very active. Rust mite control has been lessened due to showers immediately following Sulphur application. A second application in some cases have been necessary.

HILLSBOROUGH & PINELLAS

J. A. Hoffman

I am a newcomer to this territory taking the place of Mr. T. D. Watson and as a newcomer maybe I should speak softly, however, there was somebody once upon a time who said: "Speak softly and carry a big stick."

At this time I would like to warn everyone to be on the lookout for a serious increase in rust mite and also a very large increase in red and purple scale. Anyone with early oranges should certainly try to have them sprayed if they use oil immediately.

Rains have been fairly general throughout the territory and all groves are putting on an exceptional flush of summer growth which makes it look like spring the way the trees are coming out with an even growth generally well-placed all over the tree. Fruit is sizing up nicely and groves have shown a generally good response to the summer application of fertilizer.

PASCO & EAST HILLSBOROUGH

E. A. (Mac) McCartney

Many of the growers in my territory are taking it a bit easy this month after having completed their fertilizer applications and mostly finished their spray program.

The outlook for a sizeable crop this next season appears good and everyone is hoping that prices may be more satisfactory during the coming season.

Control Of Purple Scale On Citrus . . . With Parathion

HERBERT SPENCER, MAX R. OSBURN, PAUL A. NORMAN,
ENTOMOLOGY AND PLANT QUARANTINE, AGRICULTURAL RESEARCH ADMINISTRATION

INTRODUCTION

Control of purple scale (Lepidosphaes beckii (Newn.)) has been a costly problem for citrus growers of the Southeastern States for almost a century. Since 1913 the growers, following the method developed by Yothers, have used oil emulsions for control, but these materials have shown definite shortcomings. With heavy infestations, in droughts, or in cold weather they caused leaf drop; fruit sprayed late in the year remained sour; and as they could not be combined with the regular sulfur applications, spraying costs were high.

In 1947 parathion became available, and preliminary experiements were conducted to test its value for control of the citrus red mite (Paratetranychus citri (McG.)). In the first experiment Valencia orange trees were sprayed with 1 quart of 20-percent parathion emulsion concentrate to 100 gallons of water. In the second experiment the spray contained 6 pounds of 15-percent wettable parathion plus 6 pounds of wettable sulfur per 100 gallons. The high concentrations of parathion did not control citrus red mites, and even caused a delayed build-up of these mites, but there was very effevtice control of the purple scale. These results led to further experiments with parathion in combination sprays for control of the scale insects and mites of citrus. Information was sought on the minimum quantities required per 100 gallons of spray for adequate control, on its compatibility with fungicides and insecticides now in the spray schedule, on possible injurious residues on fruits and trees, on the number of applications necessary each year, and on the timing of the applications.

This circular gives the results of 15 grove experiments with parathion for control of the purple scale, and discusses utilization of this new material in the citrus spray program.

Experimental Methods and Materials

All the experiments were conducted on the east coast of Florida in commercial groves of standard varieties of oranges and grapefruit, by cooperative arrangements with the owners.[2] Some of the groves contained young trees in full bearing, and others were magnificent old groves. Uniformity of tree size was a prime consideration in the selection of each grove. Groves with missing trees, replants, or mixed varieties were avoided.

The experiments were arranged in randomized blocks. Each block contained as many trees as there were spray treatments being compared. The positions of the treatments were assigned by chance in each block, so that tree-row variations could not influence the results from the different sprays. There were 10 blocks (or replications) in all experiments except one, which had 5. In most of the experiments a standard oil-emulsion spray was included for comparison or there were check trees that received no scalicide but were included in the usual spray program for control of the citrus rust mite (Phyllocoptruta oleivora (Ashm.) and diseases. As the work progressed most of the combination sprays contained parathion and wettable sulfur, and often copper fungicides and miticides were added, to determine their compatibility and the feasibility of obtaining simultaneous control of scale insects, mites, and diseases. The sulfur used was a 90-percent wettable formulation and the basic copper sulfate contained 53 percent of copper; the emulsive oil contained 99.5 percent of oil; and the oil emulsion 90 percent.

To insure uniformity, one spray hand, trained and experienced by many years of such work, applied nearly all the sprays. He used a 200-gallon tank and a 3-cylinder pump driven by a separate gasoline engine, which delievered 35 gallons per minute when adjusted for a pressure of 400 pounds per square inch. A single lead of hose equipped with an orchard spray gun that had a single nozzle containing a No. 6 (6/64-inch) or No. 7 (7/64-inch) disk. Leaves, fruits, twigs, and branches were covered thoroughly, in what growers call an inside and outside scale-control job.

In experiments 1 to 7 and 15 the combination sprays were applied to Valencia orange trees; in experiments 11 and 12 the variety was Hamlin early orange; in 8 and 9 the sprays were applied to Temple oranges. Two varieties of grapefruit trees were included, Marsh seedless in experiment 10 and Ruby in experiments 13 and 14.

Parathion sprays were applied to citrus trees in every month of the year except September, December, and January. In some experiments two applications were made to the same trees in one year.

Experimental Results

Several months after the last spraying samples of 20 mature leaves taken at chest height around each tree, or 200 per treatment, were examined under a microscope, and the living purple scales (except eggs) on half the upper surface and half the lower surface of each leaf were counted.

Safety Precautions

Because parathion is a very poisonous chemical, special care was taken in handling it in these experiments. The driver, the mixer, and the spray hand were equipped with respirators that had suitable chemical cartridges as well as felt pads for filtering the air. The filter pads were changed daily, and the cartridges were replaced when they began to pass the odor of parathion. Wide-brimmed hats and long-sleeved shirts were worn. Clean clothing was worn each spray day. Soap and clean towels were carried in the sprayer cab, and operators washed face and hands each time the spray tank was taken

1. R. E. Brungard, Bernard Knecht, Herrick B. Cook, and James L. Sligh assisted in the experiments reported in this paper.

2. The grower cooperators were F. E. Colburn, Walter Peterson, Norman G. Platts, W F. Slade, and C. M. Stecher.

back to the water point for refilling.

In adding 15- or 25-percent parathion wettable powder to the water, the mixer always stood on the windward side and poured the material in as gently as possible to avoid stirring up the concentrated dust and being covered with it. He mixed large amounts in a 5- or 6-gallon milk can or bucket of water, with a wooden paddle, before adding it to the water in the spray tank. In spraying the leeward side of the tree, the spray hand stood first on one side of the drift and then on the other side, to get thorough coverage of the tree and at the same time to avoid the heavy spray drift.

Tablets of atropine sulfate, the antidote, were always available in the spray and service trucks, but were never needed. Physicians in the district were furnished information on symptoms and the recommended treatment of cases. All personnel were briefed thoroughly on the proper use of parathion and on safety precautions, and on the danger of being careless with parathion. Cigarette smoking was permitted only at the water-filling point, after the hands had been washed with soap and water.

The printed safety precautions on each package of parathion were helpful as an ever-present reminder that one should not get careless.

No symptoms of parathion poisoning were shown by any of the workers in these experiments. Even in the early work, when high concentrations were used, the precautions outlined were adequate. However, a single period of spraying seldom exceeded 3 days. The dangers would have been greater if the spray crew had operated continuously for a number of weeks. In such a case the safety precautions practiced would have had a more severe test.

It is clear, though, that careless workers should not be allowed to handle parathion.

Control With Parathion and With Oil Emulsion

In seven experiments there were 16 direct comparisons of control of purple scales with parathion and with oil emulsion. In all but one, parathion sprays controlled purple scales better than oil-emulsion sprays, but the differences were slight and many of them were not significant on statistical analysis. In the single case where oil seemed to be better than parthion (experiment 9), the difference was only 0.05 scale per leaf at sampling time. It may be concluded that parathion controlled the purple scale at least as well as did the oil emulsion.

Effective Spray Concentrations

In the experiments in 1947 the sprays contained high concentrations of parathion, but each year thereafter the concentration was reduced to determine the minimum that would give satisfactory control. On Valencia orange and other trees with light infestations, single sprays containing 2 pounds of 15-percent wettable parathion per 100 gallons applied between early March and late August gave good control. Two sprays, early in the summer and in the fall, containing 1 pound of 15-percent wettable parathion per 100 gallons also gave evcellent control. On grapefruit, Temple orange, and other varieties that receive copper and zinc sprays and develop heavy infestations, two applications in a year were better than single sprays, and 1 pound of 15-percent wettable parathion per 100 gallons each time was almost as good as twice that concentration.

In experiment 14, 1 pound of parathion per 100 gallons applied in March and July resulted in lower infestations at picking time than single applications of 2 pounds of parathion either in March or in July. However, these grapefruit trees had received winter nutritional sprays containing zinc and manganese and a post-bloom spray containing copper. Come-back of purple scales after the March sprays was rapid, and a heavy infestation developed. With such heavy infestations it might be better to use 1 pound of 15-percent parathion in the post-bloom spray in March and 2 pounds in the summer spray; or 1 pound could be used in the March spray, 1 pound in July, and 1 pound in the fall application of wettable sulfur.

Compatible Combinations

In 12 experiments wettable parathion was combined with wettable sulfur. This combination spray was safe for the trees and was effective. The wettable sulfur controlled the rust mites and the parathion the scale insects. Until this combination was available, separate sprays were necessary when heavy

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CONTROL OF THE PURPLE SCALE ON CITRUS WITH PARATHION

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infestations of both pests were present, because sulfur and oil sprays combined are unsafe for trees and fruits. Use of the wettable sulfur plus parathion permits omission of the summer-oil spray, at a saving to the grower.

In four experiments wettable parathion was added to the post-bloom spray of wettable sulfur and neutral copper, the copper being a fungicide for the melanose disease. This combination was also satisfactory.

In experiments 7 and 15 the miticide Neotran was added to the wettable sulfur and wettable parathion, with good results. This combination is useful where there are heavy concurrent infestations of citrus red mites, citrus rust mites, and scale insects.

Importance of Thorough Coverage

In all except one experiment thorough coverage was obtained by use of adequate gallonage applied with a single hand gun by an experienced spray hand. In experiment 10 mature Marsh seedless grapefruit trees were sprayed with a tractor-drawn, power-take-off sprayer equipped with a multi-nozzle boom. Only 8 1/3 gallons of spray per tree was delivered, which is about half the gallonage estimated for adequate coverage. The original infestation of 5.5 scales per leaf was reduced only to 1.3 scales with 2.4 pounds of 15-percent wettable parathion per 100 gallons, and to 3.04 scales with 1.2 pounds. Control was not so complete with this inadequate gallonage and poor coverage as in the other experiments. Spray coverage should be just as thorough and complete with parathion sprays as with the oil-emulsion sprays.

Parathion Residues

On January 4, 1949, 64 days after the last spraying, fruit samples were collected from the parathion-sprayed and the untreated trees in experiment 6 for determination of parathion residues.[3] After 2 months of weathering there was only 0.02 part per million of parathion on the outside skins of the fruit that had been sprayed with the suspension of wettable parathion and none on those sprayed with parathion emulsion. In the peels of the fruits sprayed with wettable parathion there was 0.70 part per million of parathion, and in those sprayed with parathion emulsion, 0.32 part per million. No parathion was detected in the juice of any of the samples. Other analyses have given similar results, and have shown that the parathion absorbed into the peel remains there for at least 4 months. From these analyses it appears that juice from oranges sprayed with parathion is safe for human consumption, but that peel products, such as orange-peel oil, marmalade, or by product used for cattle feed, might contain detectable amounts of parathion. Of these products is is believed that peel oil is the most likely to contain harmful concentrations.

Parathion for Clean-Up

Purple scale infestations may appear in the summer, fall, or early winter, especially on trees that have had residual sprays earlier or where summer sprays have been ineffective. In experiment 3 the second group of trees had no scalicide in 1947 or early in 1948. They were heavily infested by May, and were sprayed with parathion plus wettable sulfur, with good control. In other experiments not recorded, parathion was used successfully for clean-up of purple scales in September and in February. For these heavy, neglected infestations 2 pounds of 15-percent wettable parathion with wettable sulfur was used per 100 gallons, and particular attention was given to thorough coverage. Parathion provides an effective and safe material for fall and winter control of heavy infestations.

Effects on Trees, Foliage, and Fruit

Parathion caused no harm to the trees, foliage, or fruit at any time of the year. In fact its effect often appeared beneficial. In experiment 3 trees sprayed three times in a 2-year period had luxuriant foliage, very little deadwood, and exceptionally bright fruit, and they looked much better than trees in the same block that had received no parathion. Heavy infestations of the purple scale had developed in the untreated trees, many leaves had shed, some small wood was dying, and the fruits were covered with scales and sooty mold.

A beneficial effect of parathion sprays was also seen in experiment 1. Beginning in February and each month thereafter through May, fruit samples were taken from these Valencia trees, and the oranges were washed, graded, weighed, and tested for solids, acid, vitamins, juice content, color and taste.[4] The fruits from the trees sprayed with parathion were heavier, brighter in color, higher in solids-acid ratio, and rated higher in palatability than fruits from the unsprayed trees. Trees sprayed late in the year with oil were much inferior in quality to the parathion-sprayed or the unsprayed lots.

These beneficial effects were undoubtedly due in part to control of heavy insect infestations, but it is possible also that the parathion had a stimulating effect on the trees.

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3. These analyses were made by chemists of the Division of Insecticide Investigations.

U. S. STANDARDS PROPOSED FOR FLORIDA GRAPEFRUIT

The U. S. Department of Agriculture has announced a proposal to establish U. S. standards for grades for Florida grapefruit. Existing U. S. standards cover both Florida and Texas grapefruit.

Unanimously approved at a public hearing held by the Florida Citrus Commission May 9, 1952, at Lakeland, Florida, the proposed standards would differ from existing standards principally in the following respects:

1. In the U. S. No. 1 grade, the proposed standards would reduce permitted discoloration from ½ to 1/3 of the surface; change the requirement for shape from "fairly well formed" to "well formed"; and change the requirement "free from damage by buckskin" to "free from buckskin".

2. Change the definition of damage by scale, damage by ammoniation, and reduce the amount of discoloration permitted in the U. S. No. 2 grade.

3. Add the U. S. No. 3 grade which was in effect in 1947, change the pack sizes to agree with the actual count, and define diameter and mature in the standards.

British Food Team Likes American-Type "Freezers"

The British would like their housewives to have the type of "freezer" found in many American households, but when it comes to frozen fruits and vegetables, they prefer their own.

Fruits and vegetables of the British variety, they say, have more flavor.

This observation, and many others, were included in a 56-page report prepared by 16 labor-management representatives of the British food industry who were in the United States last fall to obtain new ideas on fruit and vegetable utilization. The tour was sponsored by the Economic Cooperation Administration, now the Mutual Security Agency.

The British, according to the report, were intrigued by the popularity of the frozen "French fried potato," but they found the "lack of flavour in American quick-frozen fruits and vegetables very noticeable." In their opinion: "This is because the original fresh products lack flavour compared with our own."

The report added, however, that many juices, such as orange, lemon, lime and grapefruit, are concentrated, canned and quick-frozen in America by methods which "preserve the freshness of the flavour to a very marked degree, and the potential market in these lines alone is thought to be only partially covered."

The report continued: "The American housewife has accepted quick-frozen foods in spite of their apparent high cost. The team was unable to determine whether in fact there was a saving to the housewife, the cost of time saved in preparation of fresh foods and the resulting waste being indeterminate factors.

"The pre-cooked frozen food is possibly not as popular in the U. S. as is the fresh-quick-frozen food. The popularity of the 'French fried potato' should be mentioned. Manufacturers have taken advantage of this fact to utilize their plants on this line when other products cannot be obtained fresh from the field. This has enabled American manufacturers to maintain their staffs at a reasonably constant level."

U. S. STANDARDS PROPOSED FOR FLORIDA TANGERINES

The U. S. Department of Agriculture has announced a proposal to establish U. S. standards for grades for Florida tangerines.

The proposed standards were unanimously approved at a public hearing by the Florida Citrus Commission May 9, 1952, at Lakeland, Florida. They differ from existing standards principally by providing a definition for diameter and adding a U. SS. No. 1 Russet grade. They include also other minor changes from existing standards and rewording of a number of definitions for clarification.

Interested persons may, until August 30, 1952, submit views or comments to the Fruit and Vegetable Branch, Production and Marketing Administration, Department of Agriculture, Washington 25, D. C.

There Are Many Famous Sayings . . .

Such as "50 Million Frenchmen Can't Be Wrong" . . . and that "Many a Picture Tells a Story Better Than 10,000 Words" . . . or that "Honesty Is The Best Policy" . . . and a great many other phrases which carry a large element of truth.

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